EFFECT OF SUSPENSION TRAINING ON SELECTED PHYSICAL AND PHYSIOLOGICAL VARIABLES

SHORT SYNOPSIS
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To

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(Deemed to be University)

By

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Certificate

I hereby declare that the synopsis "**EFFECT OF SUSPENSION TRAINING ON SELECTED PHYSICAL AND PHYSIOLOGICAL VARIABLES"** being submitted in the partial fulfilment of the requirement for the degree of Doctor of Philosophy in Physical Education under the Department of Sport Management & Coaching, Lakshmibai National Institute of Physical Education academic year 2023-2024.

It is a bonafide record of original work carried out under the supervision of Dr. Y.S.Rajpoot and has not been submitted in full or part to any other university or institute for a degree or diploma.

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Abstract:

The purpose of this study is to investigate how TRX Suspension Training affects a few physical and physiological characteristics in females between the ages of 18 and 25. After being chosen, 100 individuals in all participated in an organized 12-week TRX training program that was held three times a week. Changes in blood pressure, pulse rate, respiration rate, agility, flexibility, and explosive power were evaluated using a pre-test–post-test group design. Data was gathered using standardized tests, and participants were properly oriented before the program began. Descriptive statistics and paired t-tests, with significance set at 0.05, were used to examine the gathered data. The study emphasizes how suspension exercise may improve physiological efficiency and physical fitness.

Keywords:
TRX, physical fitness, physiological variables, agility, flexibility, explosive power, suspension training.

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CHAPTER - I

INTRODUCTION

Total Body Resistance Training, or TRX for short, is a strength training method that uses a "Suspension Trainer," a system of ropes and webbing, to let the user work against his own body weight. A type of resistance training known as suspension training uses body weight workouts to conduct a range of multi-planner, compound exercise motions. The concurrent development of strength, balance, flexibility, and joint stability is the goal of these exercises. Training in suspension Angus Gaedtkle and Toblas Morat (2015). "Developing Training Control and Feasibility with TRX Suspension Training: A Novel Functional Training Method for Seniors" Journal of Exercise Science International: Vol. 8; Issue 3, Article 3. TRX uses dynamic positions and functional exercises to build physical strength.

The usage of rope training dates back to the 1800s. The total resistance exercise (TRX) apparatus and related suspension training body weight exercise were created in 1900 by former navy seal and Stanford MBA graduate Randy Hetrick. He began marketing the products in 2005. Kurt Dasbach, a former professional football player in Chile, created a competing device called Inkaflexx about the same time he discovered an antiquated Andean conditioning regimen that used rope while playing in South America.

Numerous ailments, particularly cardiac diseases, are caused by physical inactivity (Birinci et al., 2019). There are numerous advantages to exercise. Studies (Paşaoğlu et al., 2019; Kirişçioğlu et al., 2019; Özdal et al., 2019; Özer et al., 2017; Vural et al., 2019) have demonstrated the hormonal, physiological, and physical impacts of these. People still don't make time for exercise in spite of this. The incapacity to derive enjoyment from physical activity is a significant deterrent to engaging in it. Avoiding traditional workouts and switching to new, more enjoyable ones is one strategy to boost the number of people engaging in regular physical activity (Birinci et al., 2020; Smith et al., 2016). In addition to traditional methods, there are different methods such as bosu ball and pilates (Anderson & Behm, 2004; Santana et al., 2007). Total Resistance Exercises (TRX) has recently been added among these training models (Bettendorf, 2010; Gaetz et al., 2014).

TRX is a novel form of exercise that has gained popularity recently. Studies have demonstrated that, despite requiring only body weight, this exercise enhances strength, balance, flexibility, and trunk stability all at once. TRX generates the physical stress required

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to establish and preserve health and fitness by utilising the resistance that the user's own body weight creates against gravity (Bettendorf, 2010; Çavlan, 2017; Dawes, 2017). Physiotherapists and athlete health clinics began using TRX training for rehabilitation. Exercise studios, sports halls, and military unit training facilities also employ it. Professional and amateur athletes commonly use it as a way to include a functional exercise strategy into their training training programs (Melrose & Dawes, 2015).

It enables the use of a band to do movements in three separate planes (Fitness Anywhere, LLC., 2011). Furthermore, it offers the chance to modify the joint angles coming from the unstable plane and to modify the exercise's intensity (Melrose & Dawes, 2015). According to reports, TRX features a highly useful structure that is intended to enhance core stability, flexibility, strength, endurance, balance, and coordination (Wibowo & Fathir, 2017). It has been shown through research to enhance coordination, preserve and improve posture, strengthen ligaments, and promote the development of strength (Pastucha et al., 2012; Carbonnier & Martinsson, 2012). Furthermore, it has been displayed that strength training with TRX improves performance and is linked to health (Carbonnier & Martinsson, 2012;Pastucha et al., 2012).

By diversifying exercise, TRX may be used virtually anywhere by anyone, regardless of age, gender, or educational attainment (Smith et al., 2016). Our literature investigation disclosed that this relatively new training programme was developed with an emphasis on rehabilitation studies, professional athletes, and the elderly (Mohamed, 2016). Nonetheless, it appears that there has been relatively little research done on how TRX affects inactive people. The study's objective was to discover how suspension training affected the young students' strength, flexibility, speed, and jump.

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Benefits of Suspension Training

Suitable for all levels: - It does not matter if you are an Olympic athlete or just venturing into a new hobby of fitness, TRX suspension training is beneficial for all levels of athlete. Just by changing your body position slightly, the load can be increased or decreased on your muscles meaning that every person can use this method of training.

Adaptability: All of your body's muscles receive an intense workout from just two adjustable bands. They are easily transportable, and the TRX suspension system can be assembled anywhere.

Enhance Strength and Cardiovascular Endurance: - TRX suspension training will enhance both your cardiovascular endurance and muscle strength. You can boost the workout

your heart and lungs receive by varying the speed at which you perform the activity.

Aid in achieving any objective: Any objective can be accomplished thanks to the personality of TRX suspension training. You might want to train for a marathon, reduce weight, or build muscle. Regular TRX suspension exercise will help you achieve your goals.

Involves the entire body: Your core is continually engaged while you do moves because of the instability the TRX suspension system provides. Furthermore, because multiple muscles are engaged simultaneously during the functional movements, a very thorough, all-aroundF

Low impact nature: - TRX suspension exercise is extremely low impact and less stressful on your joints due to its suspended nature. It indicates that there is little chance of being hurt, so you can train as hard as you want without worrying about aggravating or worsening an injury that already exists.

It's different: - Going to the gym can get boring at times, and maintaining motivation for our fitness regimens can be difficult. There is no other workout method like TRX suspension training, and you may incorporate it into your regular routine to maintain your interest and make your sessions enjoyable. By combining TRX suspension training with other activities, you will be able to get a great workout in a fun and new way.

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OBJECTIVES OF THE STUDY

1. To become aware whether there would be any significant difference on selected physical variables due to TRX Suspension Training among Female.
2. To become aware whether there would be any significant difference on selected physiological variables due to TRX Suspension Training among Female.

STATEMENT OF THE PROBLEM

- The "EFFECT OF SUSPENSION TRAINING ON SELECTED PHYSICAL AND PHYSIOLOGICAL VARIABLES"
- To suggest effective training programme for among Female players.

DEFINITION OF THE TERMS

AGILITY

The capacity for swift movement and precise direction changes is known as agility. It entails abrupt changes in direction, acceleration, and deceleration while keeping equilibrium and control. Since it allows for more effective and efficient movements, agility is essential for many sports and physical activities.

FLEXIBILITY

The range of motion at a joint, or collection of joints, is called flexibility. It requires having the complete range of motion in your muscles and joints. Flexibility is necessary for performing a variety of physical tasks, preventing injuries, and maintaining general physical condition. Exercises that involve stretching can help it.

EXPLOSIVE POWER

The ability of the leg muscles to produce their maximum force in a brief amount of time is referred to as leg explosive power. It is essential for actions like jumping, sprinting, or abrupt direction changes that call for a sudden burst of strength or speed. Strength training and plyometric activities that target fast-twitch muscle fibres are used to build this power.

PULSE RATE

The number of times per minute that the arteries dilate and constrict in response to the heart's pumping action is known as the pulse rate. It displays the heart rate, or the speed at which the heart beats.

RESPIRATORY RATE

The number of breaths taken in a minute is known as the respiratory rate

BLOOD PRESSURE

Blood pressure is the force that the body's arterial walls experience as a result of blood circulation. It is measured in millimetres of mercury (mmHg) and is represented by two numbers: the systolic pressure, which is the larger number, and the diastolic pressure, which is the lower number. Systolic pressure gauges the force the heart feels during a beating, while diastolic pressure gauges the force the heart feels in between beats. A blood pressure reading of 120/80 mmHg is considered normal.

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SIGNIFICANCE OF THE STUDY

- The study will assist in emphasising the importance of TRX training for female fitness.
- The study will contribute to the subjects' increased fitness.
- For the coaches & trainer to raise the level of fitness among female athletes.
- The outcome will be useful in creating the schedule and scheduling TRX training.
- The result will definitely contribute to the development of fitness level among female.
- The study will enhance the information in the field of sports.

HYPOTHESES

There will be a significant effect of twelve week TRX training programme on selected Physical & Physiological variables among Female Players.

LIMITATIONS

The Study is limited to:-

- One could argue that this study is limited because the research scholar has no influence over the subjects' medical background .
- The socioeconomic context of the restricted subject.
- Way of Life.
- Weather condition.
- Diet & Nutrition.
- Psychological parameters.

DELIMITATIONS

- The Study will be delimited to selective north zone of India with physical education female students.
- The study will be delimited to 100 female players, Age ranging between 18 to 25 years.
- The study will be further delimited to the following variables:- Physical Variables – Agility, Flexibility, Explosive Power and Physiological Variables – Pulse Rate, Respiratory Rate, Blood Pressure.

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CHAPTER - II

REVIEW OF RELATED LITERATURE

Physiologic and Metabolic Effects of a Suspension Training Workout:- Suspension training is a mix of special training exercises designed to increase power, flexibility, coordination, strength, endurance, and core stability in a single session. Suspension training is promoted as a resistance and cardiovascular training exercise method that is done similarly to a circuit-training session, which involves a small amount of rest in between a sequence of exercises. This study sought to determine the effects of a suspension training session on physiological and metabolic markers of intensity and performance. Techniques: Twelve male subjects (22.0 ± 0.7 years) participated in a 60-minute suspension training session focused on total body intervals using a metabolic cart. Lactate levels were measured before, during, and several times after exercise. Results: The average heart rate (HR) during the exercise was 69±2% of the anticipated maximum. Blood lactate levels rose to 8.0±0.5 mmol/L at the halfway point and remained elevated the entire time.

Effect of TRX Suspension Training on Balance, Mobility, Lower Limb Muscle Strength, and Fear of Falling in Older Men:- The present study aims to investigate the effect of eight weeks of TRX suspension training on lower limb muscle strength, balance, mobility, and fear of falling in older men. This is a quasi-experimental. Participants were 30 elderly men with a mean age of 67.9±4.3 years who were assigned into two groups of TRX (n=16) and control (n=14). In the pre-test phase, lower limb strength was measured by the 30-second chair stand test, functional balance by the Berg balance scale, functional mobility by the timed up & go test, and fear of falling by the falls efficacy scale -international. Then, the TRX group performed the functional training for eight weeks, three sessions per week, each for about one hour. After performing the exercises, post-test assessments were performed in two groups. To compare the groups, the analysis of covariance and Bonferroni post hoc test were used in SPSS software, version 19. The significance level was set at 0.05. The TRX functional training significantly improved lower limb strength, balance, and functional mobility of the elderly ($P \leq 0.001$); however, it had no significant effect on their fear of falling ($P > 0.05$). Conclusion Given the positive effects of TRX functional training on lower limb strength, functional balance, and mobility of elderly men, it seems that this suspension training can be used to improve lower limb muscle strength, functional balance, and mobility of older men.

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Effects of Two 12-week Strengthening Programmes on Functional Mobility, Strength and Balance of Older Adults: Comparison between TRX Suspension Training versus an Elastic Band Resistance Training:- The purpose of this study was to determine whether different effects on functional mobility, strength and balance ability were produced by using different devices (sling trainer and elastic bands). Twenty-four participants were assigned to two different training groups, INT (TRX-OldAge) and CON (elastic bands). Participants trained three times per week for 30 minutes for 12 weeks. The Multisurface Obstacle Test for Older Adults (MSOT) and the 1-repetition maximum test using the chest press and the leg press were performed to assess functional mobility and dynamic strength, respectively. To examine balance ability, data of body-worn sensors and a force plate measured during different standing positions have been investigated. A main time effect occurred for functional mobility ($p = 0.009$) with a significant improvement within INT ($p = 0.044$), and for the chest press ($p = 0.017$) with a significant improvement within INT ($p = 0.019$). However, there was no group-by-time interaction in any of the measured parameters. Compared to elastic band resistance training, TRX-OldAge induced similar effects on the functional mobility, strength and balance ability of healthy older adults.

EFFECT OF TRX SUSPENSION TRAINING AS A PREVENTION PROGRAM TO AVOID THE SHOULDER PAIN FOR SWIMMERS:-This study looked into the effectiveness of TRX suspension training as a program to help young swimmers avoid shoulder problems. The Ajman Club provided a random sample. (10) Those that swim, The participants took part in the TRX suspension training course. Thrace a week. up to eight weeks. The subjects had never experienced a shoulder injury. the uniformity of age, weight, and height. According to statistical analysis, the experimental group's improvement in all physical characteristics was noticeably greater between pre and post measurements. Last but not least, TRX suspension training and proper preseason screening can help prevent swimmers shoulder by identifying limitations and training mistakes that could cause symptoms. The physical therapist should determine the most likely limitations or training mistakes and rule out any serious tissue disease that would necessitate a referral to an orthopaedic surgeon if a swimmer does experience symptoms throughout the season.

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TRX Suspension Training: A New Functional Training Approach for older Adults – Development, Training Control and Feasibility: - The goal of this study was to create and assess the viability of a TRX Suspension Training program for healthy older individuals (TRX-OldAge). The 12-week intervention study was completed by eleven participants. The TRX-OldAge whole-body workout, which comprises of seven movements with three to four more challenging levels for each activity, was used to train all participants. Positional adjustments could be made at each stage to increase intensity. Training compliance and a self-created TRX-OldAge evaluation questionnaire were used to assess feasibility data. Compliance with the training was 85%. Ninety-one percent of the participants were inspired to continue the program after the trial time. Training frequency, duration, and intensity were all deemed ideal. Strength increases were the greatest, but all subjects reported good effects. TRX-OldAge can be customized for each older adult based on their own needs, preferences, and preconditions based on the comprehensive training control information.

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CHAPTER – III

PROCEDURE AND METHODOLOGY

In this chapter detail information about the selection of the data, selection of variables, selection of the drill tests, design of the study ,criterion measure, direction of the subject, administration of TRX Training, training schedule, Collection of data, Statistical Techniques used to compute the information (Data) taken in duration of the study will be discuss.

SELECTION OF DATA

The present study will be based upon the effect of Suspension Training on Females. For the present study will select 100 female's subject of 18 to 25 age groups. They will be take part in 12 weeks TRX Training Program.

SELECTION OF VARIABLES

The following variables will be select for the present study:-

INDEPENDENT VARIABLES

TRX Suspension Training

DEPENDENT VARIABLES

- **Physical Variable :-**

Agility
Flexibility
Explosive Power

- **Physiological Variable:-**

Pulse Rate
Respiratory Rate
Blood Pressure

DESIGN OF THE STUDY

For the present study Pre Test - Post Test group design will be used to find out effect of TRX training on Female Subjects.

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The group will be exposed of TRX Training with a set of exercises selected for specific purpose. The treatment groups will be train with Agility, Flexibility, Balance, Leg Explosive Power exercise for a period of 12 weeks (84 days). The training session will be conducted minimum 3 days in a week.

CRITERION MEASURE

Following criterion measures will be selected to record the data various tests.

S.no.	Variables	Testing tools
1.	Agility	4*10m Shuttle Run Test
2.	Flexibility	Sit and Reach Test
3.	Explosive power	Vertical Jump Test
4.	Pulse rate	Manual Counting / Pulse rate monitor
5.	Respiration rate (rate of breathing)	Manual Counting / Respiratory rate monitor
6.	Blood Pressure	Sphygmomanometer and Stethoscope

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ORIENTATION

An orientation program is intended to acclimate the participants to a new environment. It is crucial to provide a thorough explanation of the study in order to elicit the best effort from the participants. Therefore, the investigator will meet with the subjects prior to data collection to inform them of the study's purpose and the protocol used during the training program. This will ensure that there is no confusion regarding the amount of work expected of them. Everyone willingly consents to work together and give it their all for the sake of scientific research. Throughout the endeavor, the subjects will be quite cooperative and enthusiastic.

ADMINISTRATION OF TEST

DRILL TRAINING

The TRX training for the group will be conducted in a particular area of northern India. The group will get together three days a week for 12 weeks. Each training session will run between thirty and forty minutes, with an additional forty to sixty minutes. The training groups start with a week of basic physical fitness to make sure the individuals are emotionally and physically ready to handle a specific load for the study. After a week of conditioning, the group will receive the training. As one week's pattern is repeated for the following week, the load will be progressively altered.

The procedure for altering the load is as follows:

1. The first week's lord intensity will be low to moderate, and in the weeks that follow, it will progressively increase to moderate to high.

2. Three days a week will be dedicated to training.

3. Due to its inverse relationship with intensity, the density was modified accordingly.

4. From the first week to the next, the repeat and sets will gradually rise.

5. Training lasted 30 to 40 minutes on each trial day.

DATA COLLECTION

Before and after the 12-week training period, data will be collected. After speaking with the trainers face-to-face, the participant offered to take part in the trial and pledged to dedicate themselves entirely to the TRX suspension training program. By promising to email each subject a different abstract of the study's result, the research scholar will encourage the subjects. Throughout the investigation, the subjects' regular activities won't be interrupted.

STATISTICAL ANALYSIS

Descriptive statistics and the paired "t" test approach will be used to analyze the data in order to determine how the TRX Suspension Training program affects particular physiological and physical factors. A significance threshold of 0.05 was established.

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